Quiz 8: 2/4/15

Question 1

Give two advantages of user level threads and two advantages of kernel level threads.

- User level threads
  - Faster
  - Smaller
  - Used in OSes that don't offer threading
- Kernel level threads
  - Take advantage of multiple processors
  - System calls only block thread, not process

Question 2

Explain briefly what the following code will output? Is there any chance that the code may output something different than what is seemlingly expected?

```
#include<stdio.h>
#include<pthread.h>

void *print(void* arg){
    int* num = (int*)arg;
    printf("%d, ", *num);
    *num *= 2;
    return (void*)(num);
}

int main(int argc, char** argv){
    pthread_t threads[10];
    int numbers[10];
```

```
    int numbers2[10];
    void *tmp;
    int i;
    for(i=0; i<10; i++){
        numbers[i] = i;
        pthread_create(&threads[i], NULL, print, (void*) &numbers[i]);
    }
    for(i=0; i<10; i++){
        pthread_join(threads[i], &tmp);
        numbers2[i] = *(int*)tmp;
    }
    for(i=0; i<10; i++){
        printf("%d, ", numbers2[i]);
    }
    printf("Done\n");
}
```

Output (note, the order of these numbers may vary depending on what order the threads run in)

```
2, 4, 0, 1, 3, 5, 6, 7, 8, 9, 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, Done
```